REMARKS

Applicant has carefully considered the Office Action dated June 29, 2005 and the references cited therein. Applicant respectfully requests reexamination and reconsideration of the application.

The Examiner has objected to claims 1 and 2 for minor informalities. In response, Applicant has amended the claims as suggested by the Examiner and in a manner to overcome such objections. Claim 53 has also been amended to correct a grammatical error. These amendments have not been made to distinguish over any reference of record and no narrowing of any corresponding equivalents to which the amended limitation(s) or claim(s) is/are entitled is intended by these amendments.

In addition, applicant has amended claim 20 to conform the claim language with 35 U.S.C. Section 112, second paragraph. As such, the amendments have been made to clarify the language of the claim, not to distinguish over any other reference of record whether considered singularly or in combination. The examiner will note that the phrase " a first delay value" does not require an antecedent basis, nor is the applicant required to specify which if any of the first delay module, second delay module, combination thereof, or other component is the source of such delay value in order to comply with 35 U.S.C. Section 112, second paragraph.

Claims 42, 43 and 57-59 are rejected under 35 USC 101 because the claimed invention is directed to non-statutory subject mater. Applicant has amended the preamble each of the claims 42 and 53 and respectfully asserts that each of the claims recites statutory subject matter.

Claims 1, 2, 13-20, 42, 43, 53, 54 and 57-59 are rejected under 35 USC 103(a) as being unpatentable over Rao (U.S. Patent 6,665,409). In setting forth the rejection, the examiner has admitted that Rao does not disclose a notchpass filter with delay output response characterized by a plurality of peak delay maximum at certain frequencies and decreased gain minimum at the same certain frequencies, or, that the combined notchpass filter and energy storing network has an amplitude output response characterized by a plurality of gain minimum at the same certain frequencies and a plurality of delay maximum at the same certain frequencies so that the decay rate is subtantially identical at all frequencies. However, the Examiner is alleging that

choosing a notchpass filter with a plurality of delay maximums at the same location as the gain minimums is a design choice by applicant. Prior to addressing the claim rejections, Applicant respectfully requests that the examiner consider the following comments.

The Rao '409 patent is one of many reverberation patents that use a variation of the basic topology first disclosed over forty years ago in US Patent 3,110,771, Logan, Jr. et al, hereafter Logan '771, (Applicant's IDS, submitted 8/23/01). This topology comprises one or more comb filters in cascade with one or more allpass networks. Figure 8A of Roa '409 clearly shows the cascade combination of comb filters in the left most dotted block and allpass filters in the right most dotted block. The same topology is also shown in Figure 5 of the Logan '771 patent. A review of the properties of the two types of modules used in the Roa topology, namely comb filters and allpass filters, is appropriate.

A comb filter comprises a relatively long delay line with a feedback path that recirculates energy from the output back to the input. Such a structure will have a comb-like series of gain maxima. Roa '409 adds an extra function to this basic comb filter, as shown in Figure 8B, that implements a low-pass filter within said feedback loop. The Examiner's citation in Roa '409 (col. 11, lines 47-67, col. 12, lines 1-18) suggesting that independent control over the frequency of gain minima and delay maxima (properties of a notchpass) are a design choice by setting appropriate values of coefficients G1 and G2, is not physically or theoretically possible. These two coefficients can only influence the frequency cutoff of the low-pass filter and the size of the gain maxima. Roa '409 states "a low pass filter in the feedback loop simulates the absorption of high frequencies by air" (col. 10, lines 44-46). These coefficients have no influence on the frequency of gain minima and delay maxima. They are never at the same frequency.

Because a comb filter, with or without the additional low-pass filter, has gain maxima and delay maxima at the same periodic sequence of frequencies, such a structure cannot create gain minima at frequencies of delay maxima for any values of G1 and G2. Additional signal path(s) and additional coefficients are required to align gain maxima with delay minima. The freedom to choose coefficients for a specific topology does not imply that there exists a choice that can create such an alignment.

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Without any means for aligning gain minima with delay maxima, the design represented by Figure 8B of Roa '409 simply cannot be the basis of a notchpass. Applicant would be happy to supply detailed mathematics to show the alignment of gain and delay maxima in a comb filter.

An allpass filter comprises a delay line, a feedback path, and a feedforward path, as illustrated in Figure 8c of Roa '409. Like the comb filter in combination with a lowpass filter in Roa, two coefficients G1 and G2 are provided, but these are explicitly linked together to achieve an allpass characteristic as disclosed in Roa '409 (col. 11, line 14). The relationship between G1 and G2 "should be guaranteed by the host." This guarantee ensures an allpass characteristic where the frequency response is flat, hence, without gain minima. Roa '409 does not suggest, or even imply, that these two coefficients could be related in any other way. The desirability of having flat frequency response for allpass filters when used in a cascade configuration has been standard practice, and with that assumption, a notchpass characteristic cannot be achieved.

Within Roa '409, there are choices for selecting the frequency interval between gain maximums, for specifying the amplitude of said maximums, for controlling the cutoff frequency of the low-pass filter, for controlling the reverberation time, and for reducing coarseness resulting from mismatch among delay times in comb filters. However, the assumption that there are choices within Roa '409 for achieving gain minimums aligned with delay maximums is simply not valid.

In light of the foregoing, Applicant traverses the rejection of claims 1, 2, 13-20, 42, 43, 53, 54 and 57-59 under 35 U.S.C. §103(a) on the grounds that the Examiner has failed to create a *prima facie* case of obviousness. In accordance with MPEP §2143.03, to establish a *prima facie* case of obviousness 1) the prior art reference must teach or suggest *all* of the claim limitations; 2) there must be some suggestion or motivation to modify a reference or combine references; and 3) there must be a reasonable expectation of success.

In setting forth rejection of claims 1, 2, and 13, the Examiner has admitted that Rao does not disclose a notchpass filter with the claimed delay output response, but instead alleges   "choosing a notchpass filter with a plurality of delay maximums at the same frequencies as the gain minimums is a design choice by applicant" (Page 6, line

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12-13). Applicant respectfully traverses such rejections. First, for the reasons stated above, if the examiner is alleging that there are component value choices within the circuit topology of Roa '409 for achieving gain minimums aligned with delay maximums, such presumption is simply not valid. There is no combination of values for coefficients G1 and G2, in the design of Figure 8B of Roa '409, that will result in an amplitude output response characterized by a plurality of gain minimum at the same frequencies as the plurality of delay maximum (Declaration of Barry A. Blesser, under 37 CFR section 1.132, Paragraph 10, supplied herewith). Second, if the examiner is alleging that it is a mere design choice to have a filter with the a plurality of delay maximums at the same frequencies as the gain minimums, such argument is unsupported by the record. In accordance with The Manual of Patent Examining Procedure section 2144.03, Applicant respectfully requests the Examiner to produce a reference in support of his assertion, or, alternatively, if such assertion is based on the personal knowledge of the Examiner, to provide Applicant with an affidavit averring to the specific facts supporting the personal knowledge on which the Examiner's statement is based.
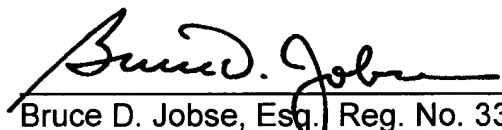
Part of Applicant's invention was the recognition that, contrary to the common wisdom of experts, feedback around a network that has flat frequency response will not necessarily produce flat decay times. Reverberation time is determined by the ratio of delay to gain expressed in dB (logarithm), as explained in '771 (col. 6, line 53.). While the gain of an allpass is flat, its delay time has a periodic series of maxima. Hence, an allpass filter cannot be used as an echo-multiplier network within a loop without also destroying the property of constant reverberation time. However, the inventive notch pass filter has the additional degree of freedom to produce controlled gain minima at those same frequencies where there are delay maxima. Even though both the gain and delay, as a function of frequency, display a characteristic comb shape, the ratio of the two remains constant. The claimed notchpass filter thus provides the advantages of echo multiplication within a feedback loop without creating the unwanted property of variable reverberation time.

The claimed notchpass filter would not have been invented without first recognizing the problem that it solves. Further, if the claimed notchpass filter was a mere design choice or extension of the prior art it would have been discovered and

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implemented long ago given that the basic theory and implementation of cascade reverberator devices was first taught in 1963 by patent '771. Forty years is a long time for experts to have ignored an obvious design choice. In conclusion, the claimed notchpass filter cannot be consider to be an obvious extension of the prior art. Applicant respectfully asserts that the claims patentably distinguish over Roa '409, whether considered alone or in combination with any other art of record.

Applicant believes the claims are in allowable condition. A notice of allowance for this application is solicited earnestly. If the Examiner has any further questions regarding this amendment, he/she is invited to call Applicant's attorney at the number listed below. The Examiner is hereby authorized to charge any fees or credit any balances under 37 CFR §1.17, and 1.16 to Deposit Account No. 02-3038.

Respectfully submitted,

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